

NEW DESCRIPTIONS

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THREE NEW SPECIES OF GENUS *ISOETES* L. FROM RAJASTHAN, INDIA¹

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(With a plate)

Seven species of the genus *Isoetes* have been recorded from India (Pant & Srivastava 1962, Goswami & Arya 1970). The genus is well represented in Rajasthan (Mital 1969, Gena *et al.* 1976, Mishra & Bhardwaja 1978). Taxonomic comparison of Rajasthan material of this genus with the known Indian material and descriptions of species reported since the publication of Pfeiffer's monograph in 1922 (Svenson 1944, Morton 1945, Taylor *et al.* 1975, Rury 1978) has indicated that at least three of the taxa in Rajasthan could be accorded status of new species. The morphological features of these new species are now being described:

***Isoetes rajasthanensis* sp. nov.**
(Figs. 1-4)

Planta terrestris; rhizomorpha typica 2-lobata; folia 7.5-12 cm longa, filis peripheralibus nullis; labium nullum velum tres-quadranti ad totum sporangium tegens. Megaspores trimorphicae, reticulationibus, 330-350 μ m, 250-280

μ m, 180-210 μ m diam.; megaspores articulatae/connatae plerumque; microspores dimorphicae, laeves, 25-30 μ m, 18-22 μ m diam.

Plants terrestrial, 7.5 to 12 cm in height (Fig. 1), growing near the margins of streams and on moist soil. Rhizomorph typically 2 lobed (Fig. 2). Leaves 15-39, limb cylindrical, base expanded showing membranous margins, peripheral strands absent. Ligule elliptic with mucilaginous hairs on margins and apex. Labium absent. Velum covering three fourths or almost entire sporangium. Megasporangia elongate (4 x 2 mm) or ovate (3 x 2 mm); sterile cells absent. Megaspores trimorphic, dark brown when wet and white when dry. Megaspores ranging between 330 to 350 μ m in diameter. Exine with branched ridges (Fig. 3). Bodily fused megaspores are of common occurrence. Microsporangia rare, elongated (3 x 1.5 mm), microspores dimorphic (Fig. 4), dark brown when wet and creamy white when dry; large microspores 25-30 μ m in diameter, small 18-22 μ m in diameter, exine smooth.

Fertile: July to September.

Type: Anadera point, Mount Abu, Rajasthan, India, growing on moist ground near the margins of streams. Collector, C. B. Gena (CBG/I-6, Oct., 1976). Deposited at the her-

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barium, Botany Department, Punjabi University, Patiala, India (PUN. 3241).

Isotypes: Herbarium, Pteridophyte Biology Lab., Department of Botany, Government College, Ajmer, India (No. PBL/75/I-9/727), CAL & US.

Paratypes: Mainal (Chittorgarh), Rajasthan, India growing near the margins of a stream during rainy season.

Of the Indian species *I. rajasthanensis* is comparable to *I. sampathkumaranii* Rao in size, absence of peripheral strands and velum characters but differs from the latter in the characters of mega- and microspores. Moreover, *I. rajasthanensis* happens to be the only small sized species with a velum covering three fourths of the sporangium and possessing trimorphic megaspores.

According to Pfeiffer's (1922) scheme *I. rajasthanensis* falls under reticulatae section with affinities to *I. engelmannii* A.Br. but can be distinguished from the latter by its habit (terrestrial Vs. submerged), ligule (elliptic Vs. cordate), velum (almost complete Vs. very narrow), nature of megaspores (polymorphic Vs. dimorphic), megaspore exine (reticulated Vs. honey combed) and microspores (dimorphic Vs. monomorphic).

***Isoetes reticulata* sp. nov.**
(Figs. 5-7)

Planta terrestris; rhizomorpha 2-lobata; folia 4-10 cm longa, filis peripheralibus nullis; labium nullum, velum fere totam sporangium tegens. Megasporeae dimorphicae, reticulationibus ramosissimis, 230-245 μ m, 170-180 μ m diam; megasporeae articulatae/connatae omnino nullae.

Plants terrestrial, 4-10 cm in height (Fig. 5) growing on moist soil. Rhizomorph 2 lobed rarely 4 lobed (Fig. 6). Leaves 6-24, limb cylindrical, base expanded, peripheral strands

absent. Ligule elliptic with straight mucilagenous hairs on margins and apex. Labium absent. Velum almost covers entire sporangium, except for a basal arched slit. Megasporeangia circular (1.5 x 1.5 mm). Sterile cells absent. Megaspores dimorphic; black when wet and white when dry. Megaspores ranging between 230 to 245 μ m in diameter, Exine with richly branched reticulations (Fig. 7). Joined or fused megaspores are totally absent. Microsporangia not observed.

Fertile: July to September.

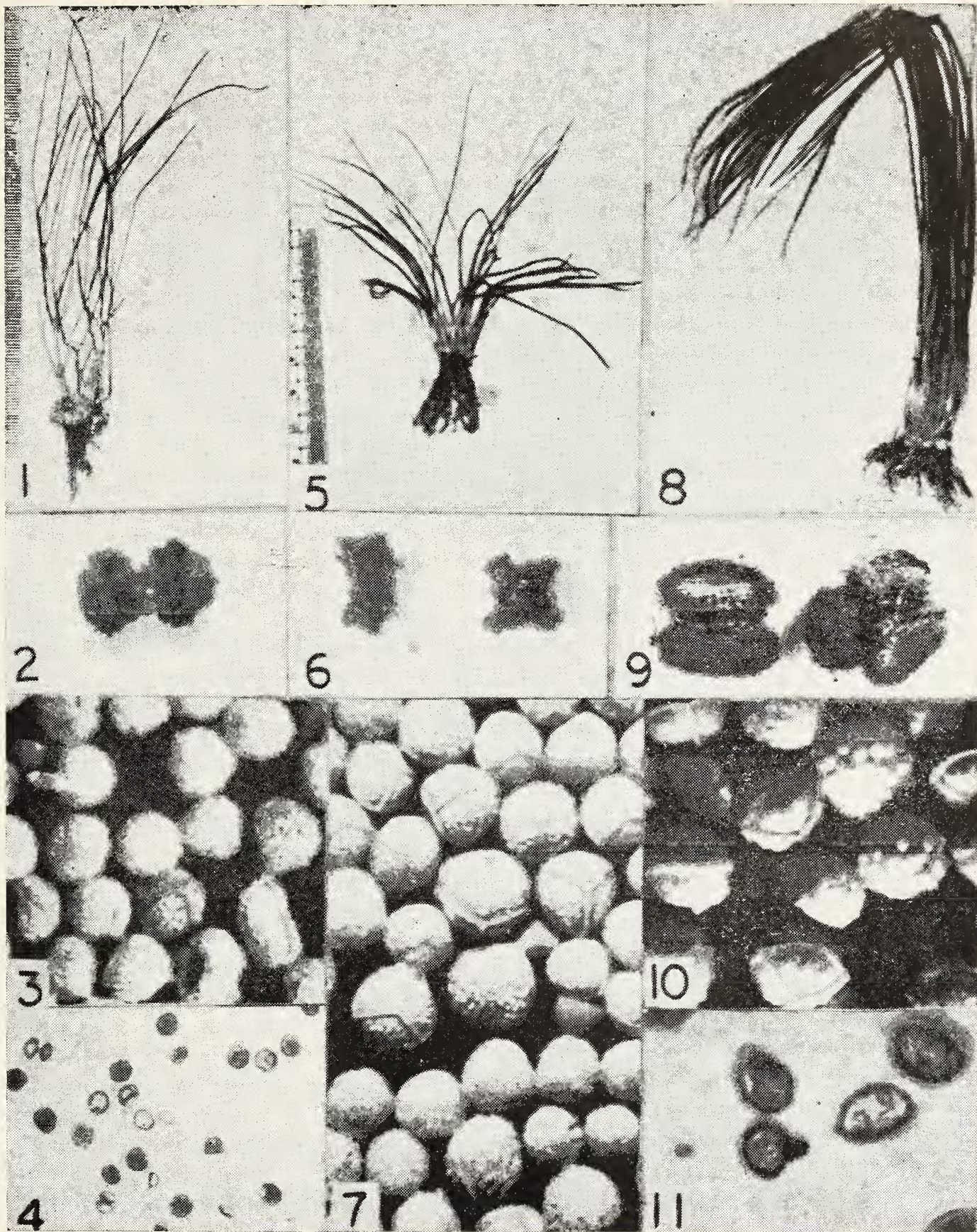
Type: Atru (Kota), Rajasthan, India growing on wet gravelly soil during the monsoon. Collector, C. B. Gena (CBG/I-12, Sept., 1975). Deposited at the herbarium, Botany Department, Punjabi University, Patiala, India (PUN. 3243).

Isotypes: Deposited at Herbarium, Pteridophyte Biology Lab., Department of Botany, Government College, Ajmer, India (PBL/75/I-9/732), CAL & US.

Paratypes: Jhalawar, Rajasthan, India, near the margins of a stream.

This species resembles *I. panchananii* Pant & Sriv. in having dimorphic megaspores with reticulations but differs from the latter in size (upto 10 Vs. 24 cm), velum length (complete Vs. half) and megasporangium shape (circular Vs. oval). Moreover, the sporangial wall of *I. panchananii* is typically brown spotted while that of *I. reticulata* is plain. *I. reticulata* is the only Indian species of this genus with well defined reticulations on megaspores and hence derives its specific name.

I. reticulata falls under the section Reticulatae of Pfeiffer (1922) and may be compared with *I. tuckermanii* A. Br. but differs significantly from the latter in features of habitat (terrestrial Vs. submerged), ligule (elliptic Vs. triangular), velum (complete Vs. one-third), sporangia (circular Vs. oblong) and megaspore



Figs. 1-11. Morphological features of three new Indian species of *Isoetes*.
 Figs. 1-4. *I. rajasthanensis* sp. nov. 1. Habit; 2. Bilobed rhizomorph; 3. Megaspores showing branched rides and bodily fused megaspores. x 400; 4. Dimorphic microspores. x 300.
 Figs. 5-7. *I. reticulata* sp. nov. 5. Habit; 6. bi-and tetra-lobed rhizomorph; 7. Megaspores showing branched reticulations. x 400.
 Figs. 8-11. *I. tuberculata* sp. nov. 8. Habit; 9. bi-and tri-lobed rhizomorph; 10. Megaspores showing round tubercles. x 400; 11. Dimorphic microspores. x 400.

